Applicant : David S. Taubman
Serial No. : 10/631,884
Filed : July 29, 2003
Page : 7 of 10

Attorney's Docket No.: 10991918-2
Amendment dated Oct. 1, 2007
Reply to Office action dated June 1, 2007

Remarks

I.   Status of Claims

Claims 1-10 and 12-18 were pending.

Claims 13-18 have been canceled without prejudice.

Claims 19-26 have been added. Claims 19 and 23 recite elements that essentially track the elements of claim 1; claims 20 and 24 recite elements that essentially track the elements of claim 2; claims 21 and 25 recite elements that essentially track the elements of claim 3; and claims 22 and 26 recite elements that essentially track the elements of claim 4.

II.   Claim rejections under 35 U.S.C. § 103

The Examiner has rejected claims 1-10 and 12 under 35 U.S.C. § 103(a) over the documents WG1N1020R and WG1N1201 (referred to herein as the "disclosed JPEG prior art"), which are described in the present application, in view of Christopoulos (WO 99/16250).

A.   Independent claim 1

Claim 1 has been amended and now recites:

> 1.   A method of compressing image data, comprising:
>
> decomposing the image data into code-blocks of coefficients using a transform, each code-block comprising a plurality of bit-planes from a most significant bit-plane to a least significant bit-plane;
>
> decomposing ones of the bit-planes into multiple contextual data coding passes of coefficient data in the code-blocks, wherein the coding passes include at least one significance propagation coding pass and at least one magnitude refinement coding pass; and
>
> forming an encoded bit-stream by coding ones of the coding passes of the coefficient data in the code-blocks according to an arithmetic coding scheme in order to form an encoded bit-stream;

Applicant : David S. Taubman
Serial No. : 10/631,884
Filed : July 29, 2003
Page : 8 of 10

Attorney's Docket No.: 10991918-2
Amendment dated Oct. 1, 2007
Reply to Office action dated June 1, 2007

wherein coefficient data from the significance propagation
pass and the magnitude refinement pass in at least one bit-plane is
included in the encoded bit-stream without arithmetic coding.

The Examiner has stated that the disclosed JPEG prior art "does not teach or suggest the
feature that 'coefficient data from at least one bit-plane is included in the encoded bit-stream
without arithmetic coding.'" Regarding Christopoulos, the Examiner has stated that:

> Christopoulos teaches a compression system and method:
>
> --coefficient data from at least one bit-plane is included in the
> encoded bit-stream without arithmetic coding. (last paragraph,
> page 2; paragraph 2, page 3; paragraph 1, page 9; paragraphs 2 and
> 5, page 11; Fig. 2; The coding is done in a bit-plane basis and
> applicable to wavelet transformed coefficients. The raw bits are
> included in the encoded bit-stream without arithmetic coding
> because there is little to gain. Fig. 2 shows that there are 4 rawbits
> in the LSB side.)

Regarding entropy encoding of the raw bits, Christopoulos discloses:

> (Page 2, last ¶; emphasis added): Thus, according to the invention,
> for each coefficient, the first non-zero bit, starting from the most
> significant to less significant bits, is called the First significant bit
> (FSB). The bits of a coefficient prior to the first significant bit will
> be referred to as the Zero bits (ZBs). The sign information is
> represented by the Sign bit (SB), while the rest of the bits after the
> first significant bit are called Raw bits (RBs). Coding is done
> bitplane by bitplane. In each bitplane, the coding is from the lowest
> frequency coefficient to the highest frequency.

> (Page 2, second ¶): After the sign bit, the RBs have to be
> transmitted. These contain very little redundancy and there is very
> little to be gained by trying to encode these with a good prediction.

> (page 8, last three lines - page 9, line 3; emphasis added): For the
> raw bits of all coefficients only one context can be used. This is
> only slightly better than sending the bits raw without entropy
> coding. This is also true for the AC coefficients sign bits and these
> were also encoded using only one context. It should be noted that it
> is possible to send them as raw bits and not encode them with

Applicant : David S. Taubman
Serial No. : 10/631,884
Filed : July 29, 2003
Page : 9 of 10

Attorney's Docket No.: 10991918-2
Amendment dated Oct. 1, 2007
Reply to Office action dated June 1, 2007

arithmetic coding. This might reduce the performance but will
increase the execution speed of the algorithm.

Christopoulos discloses an embedded still image coding algorithm. A flow chart of the
coding algorithm is shown in FIG. 8 (see page 3, ¶ 14). In accordance with this algorithm raw
bits are sent only during the refinement pass (see, e.g., FIG. 8, step 845; page 6, ¶ 8; also see
page 7, lines 31-38). In the sections of Christopoulos' disclosure copied above, Christopoulos is
referring to omitting arithmetic coding of only the refinement bits. Christopoulos does not
disclose or suggest anything that would have led one skilled in the art to the method now recited
in claim 1, in which "coefficient data from the significance propagation pass and the magnitude
refinement pass in at least one bit-plane is included in the encoded bit-stream without arithmetic
coding." Indeed, Christopoulos does not even hint that there would be anything whatsoever to
be gained by not arithmetically coding coefficient data from the significance propagation pass.

In summary, none of the cited references, taken alone or in any permissible combination,
teaches or suggests the bit-plane coding based method and system recited in claim 1, in which
includes "coefficient data from the significance propagation pass and the magnitude refinement
pass in at least one bit-plane is included in the encoded bit-stream without arithmetic coding."
For at least this reason, the rejection of independent claim 1 under 35 U.S.C. § 103(a) now
should be withdrawn.

B.   Dependent claims 2-5 and 12

Each of claims 2-5 and 12 incorporates the elements of independent claim 1 and therefore
is patentable over the disclosed JPEG prior art and Christopoulos for at least the same reasons
explained above.

C.   Claims 6-10

Independent claim 6 has been amended and now recites elements that essentially track
the pertinent elements of independent claim 1 discussed above. Therefore, independent claim 6
is patentable over the disclosed JPEG prior art and Christopoulos for at least the same reasons
explained above in connection with independent claim 1.

Applicant : David S. Taubman
Serial No. : 10/631,884
Filed : July 29, 2003
Page : 10 of 10

Attorney's Docket No.: 10991918-2
Amendment dated Oct. 1, 2007
Reply to Office action dated June 1, 2007

Each of claims 6-10 incorporates the elements of independent claim 6 and therefore is patentable over the disclosed JPEG prior art and Christopoulos for at least the same reasons.

D.   New claims 19-26

Independent claims 19 and 23 recite elements that essentially track the elements of independent claim 1 and therefore are patentable over the disclosed JPEG prior art and Christopoulos for at least the same reasons explained above in connection with independent claim 1.

Each of claims 20-22 incorporates the elements of independent claim 19 and therefore is patentable over the cited references for at least the same reasons.

Each of claims 24-26 incorporates the elements of independent claim 23 and therefore is patentable over the cited references for at least the same reasons.

III.   Conclusion

For the reasons explained above, all of the pending claims are now in condition for allowance and should be allowed.

Charge any excess fees or apply any credits to Deposit Account No. 08-2025.

Respectfully submitted,

Date: October 1, 2007

Edouard Garcia
Reg. No. 38,461
Telephone No.: (650) 289-0904

Please direct all correspondence to:

Hewlett-Packard Company
Intellectual Property Administration
Legal Department, M/S 35
P.O. Box 272400
Fort Collins, CO 80528-9599